Ordering number: EN 5108

Monolithic Linear IC



No. 5108

LA7411,7411M

Playback Amplifier and Record Amplifier for VHS VCRs

Overview

The LA7411 and LA7411M are playback and record amplifier IC for two-head VHS VCRs. When used in conjunction with the video signal processing ICs of the LA7420/30 series, it is possible to eliminate the need to adjust the Y/C record current.

Functions

- 2-channel playback amplifier.
- 1-channel record amplifier.
- REC/PB mode switching head switch circuit.
- Envelope wave detection (for auto-tracking).

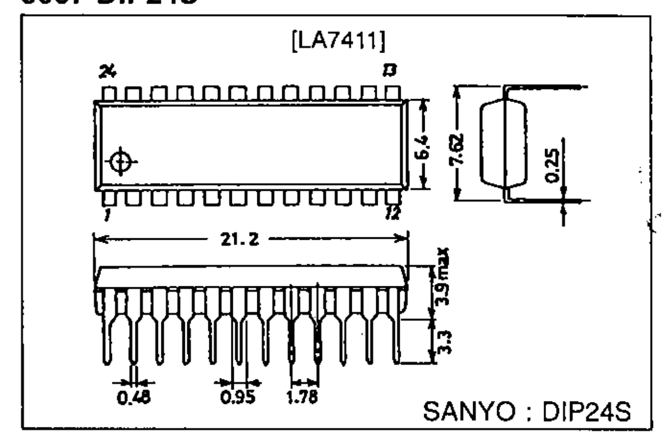
Features

- The record amplifier provides stable record characteristics in constant current drive mode, which is able to withstand load fluctuations. In addition, the built-in AGC eliminates the need to adjust the record current.
- Designed to share printed circuit boards with the LA7416/7416M (for 4-head systems).

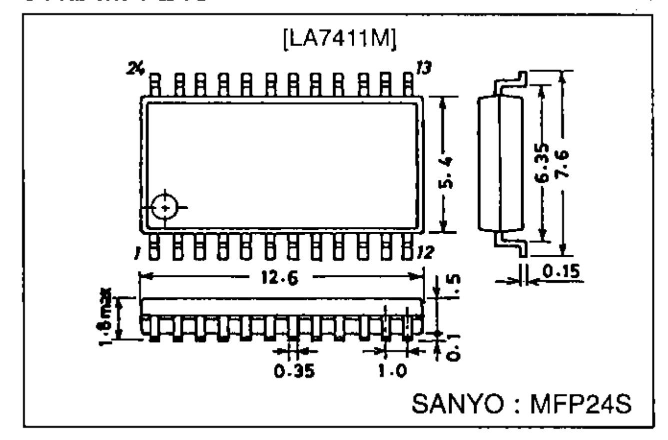
Package Dimensions

unit : mm

3067-DIP24S



3112-MFP24S



Specifications

Maximum Ratings at Ta = 25 °C

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	V_{CC}max		7.0	V
Allowable power dissipation	Pd max	Ta ≦65 °C	700	mW
			*500	mW
Operating temperature	Topr		–10 to +65	°C
Storage temperature	Tstg		–40 to +150	°C

*: LA7411M Pd max value which represents the value when mounted on the board.

Operating Conditions at Ta = 25 °C

Parameter	Symbol	Conditions	Ratings	Unit
Recommended supply voltage	V_{CC}		5.0	V
Operating supply voltage range	$V_{CC}op$		4.8 to 5.5	V

Electrical Characteristics at Ta = 25 °C

Parameter		Symbol	Input	Output	Conditions	T1	T2	min	typ	max	Unit
[PB Mode]					T12: 5.0 V T10: Open T4: Open (PB)	EP/SP	SW30 MUTE				
Current consumption		I_{CCP}			Pin 12 input current		0	14	18	22	mA
Voltage gain L	CH1	G_{VP1}	T17A	T7A	V_I = 38 mVp-p f = 1 MHz		0	56.5	59.5	62.5	dB
Voltage gain H	CH2	G_{VP2}	T20A	T7A			2.5	56.5	59.5	62.5	dB
Voltage gain difference		ΔG_{VP1}			$G_{VP1} - G_{VP2}$			–1	0	+1	dB
Equivalent input noise voltage	CH1	$V_{NIN}1$	T17A	T7A	After 1.1 MHz LPF $V_{OUT}/G_{VP1,2}$		0		1.1	1.5	μVrms
	CH2	$V_{NIN}2$	T20A	T7A			2.5		1.1	1.5	μVrms
Frequency characteristics	CH1	$\Delta Vfp1$	T17A	T7A	V_I = 38 mVp-p, f = 7 MHz $V_{OUT}/G_{VP1,2}$ output ratio		0	–2.5	+1		dB
	CH2	$\Delta Vfp2$	T20A	T7A			2.5	–2.5	+1		dB
Secondary harmonic distortion	CH1	$V_{HDP}1$	T17A	T7A	V_I = 38 mVp-p, f = 4 MHz 8 M component / 4 M component output ratio		0		–40	–35	dB
	CH2	$V_{HDP}2$	T20A	T7A			2.5		–40	–35	dB
Maximum output level	CH1	$V_{OMP}1$	T17A	T7A	f = 1 MHz Output level when tertiary distortion of the output is –30 dB		0	1.0	1.2		Vp-p
	CH2	$V_{OMP}2$	T20A	T7A			2.5	1.0	1.2		Vp-p
Cross-talk (Note 1)	CH1	$V_{CR}1$	T20A	T7A	V_I = 38 mVp-p, f = 4 MHz $V_{OUT}/G_{VP1,2}$ output ratio		0		–40	–35	dB
	CH2	$V_{CR}2$	T17A	T7A			2.5		–40	–35	dB
Output DC offset		$\Delta V_{ODC}1$		T7	CH1–CH2		0 2.5	–100	0	+100	mV
Envelope wave detection output pin voltage		V_{ENV}		T5	T5 DC voltage with no input	0	0	0	0.8	1.5	V
Envelope wave detection voltage SP1		$V_{ENVSP}1$	T17A	T5	f = 4 MHz, T7A: Adjusted to 175 mVp-p	0	0	2.0	2.5	3.0	V
Envelope wave detection voltage SP2		$V_{ENVSP}2$	T17A	T5	f = 4 MHz, T7A: Adjusted to 450 mVp-p	0	0	4.5	4.8	5.0	V
Envelope wave detection voltage EP1		$V_{ENVEP}1$	T17A	T5	f = 4 MHz, T7A: Adjusted to 125 mVp-p	5.0	0	2.0	2.5	3.0	V
Envelope wave detection voltage EP2		$V_{ENVEP}2$	T17A	T5	f = 4 MHz, T7A: Adjusted to 350 mVp-p	5.0	0	4.5	4.8	5.0	V
ON resistance of SW-Tr which is turned ON in PB mode		$R_{PON}14$		P-14	DC difference measured for 1 mA, 2 mA current inflow				4.0	6.0	Ω
Threshold level EP/SP		EPS-1		T1	SP → EP	*		1.7		5.0	V
		EPS-2		T1	EP → SP	*		0.0		1.3	V
Threshold level SW30		SW30-1		T2	Lch → Hch		*	1.2		5.0	V
		SW30-2		T2	Hch → Lch		*	0.0		0.8	V

Note 1: Status where input stage L (8.2 μH) is shorted
"*" represents output pins.

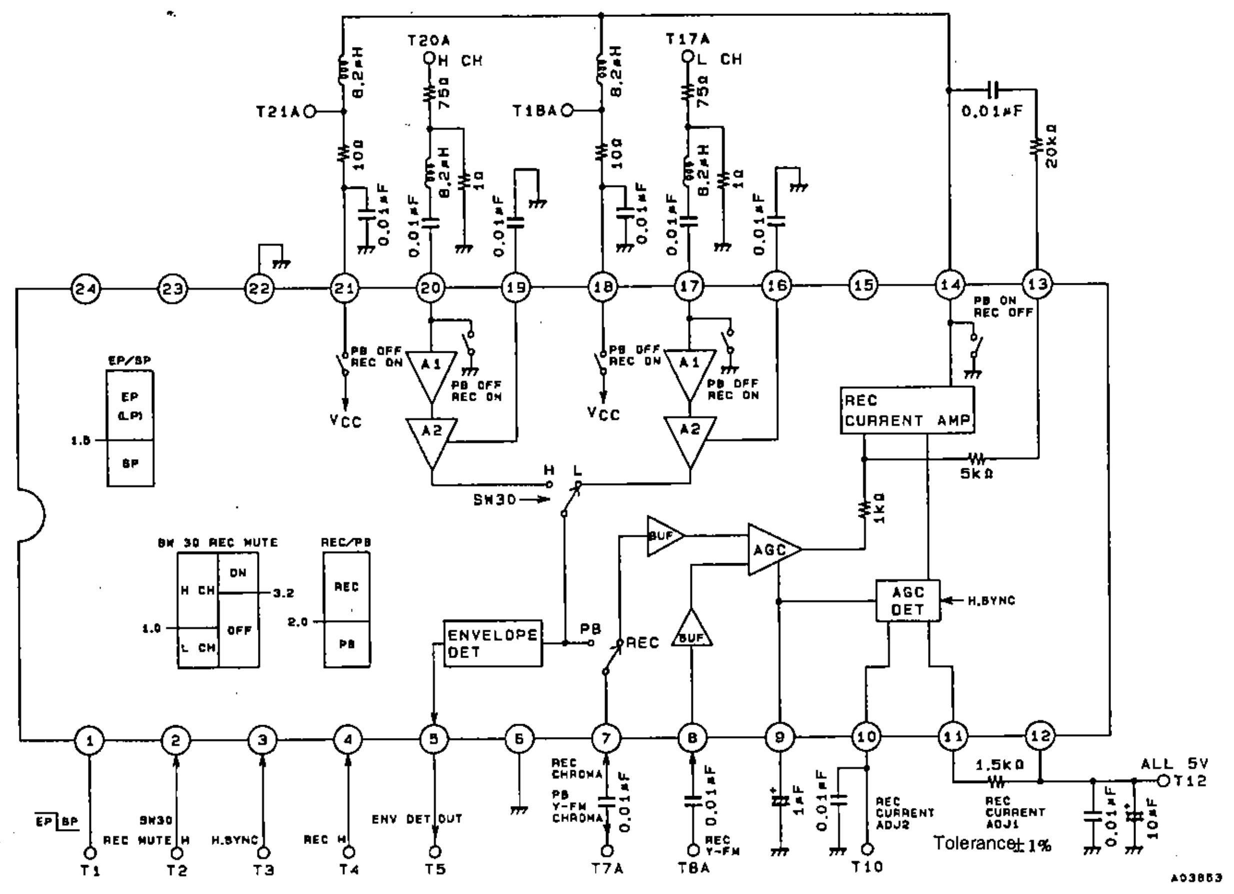
Electrical Characteristics at Ta = 25 °C

Parameter	Symbol	Input	Output	Conditions	T10	T2	min	typ	max	Unit
[REC Mode]				T12: 5.0 V T3: 5.0 V T4: 5.0 V(REC)	REC Adj2	SW30 MUTE				
Current consumption	I_{CCP}			Pin 12 input c urrent	Open	0	38	46	54	mA
REC AGC Amp output level	V_R	T8A	T18A	f = 4 MHz V_I = 200 mVp-p	Open	0	116	123	130	mVp-p
AGC Amp control characteristics 1	$\Delta V_{AGC}1$	T8A	T18A	f = 4 MHz, V_I = 400 mVp-p Output level/ $V_{RSP, EP}$ ratio	Open	0		0.5	1.0	dB
AGC Amp control characteristics 2	$\Delta V_{AGC}2$	T8A	T18A	f = 4 MHz, V_I = 100 mVp-p Output level/ $V_{RSP, EP}$ ratio	Open	0	–1.0	–0.5		dB
AGC Amp frequency characteristics (Note 2)	ΔV_{FR}	T8A	T18A	f = 1 M, 7 MHz V_I = 200 mVp-p 7 MHz/1 MHz, output ratio	Open	0	–4.0	–3.0	–2.0	dB
AGC Amp secondary harmonic level	ΔV_{HDR}	T8A	T18A	f = 4 MHz, V_I = 200 mVp-p 8 M component / 4 M component output ratio	Open	0		–45	–40	dB
AGC Amp maximum output level (Note 3)	ΔV_{OMR}	T8A	T18A	f = 4 MHz, output level when secondary distortion of the output is –35 dB	Adj.	0	20	22		mAp-p
AGC Amp mute attenuation	ΔV_{MR}	T8A	T18A	f = 4 MHz, V_I = 200 mVp-p Output level/ $V_{RSP, EP}$ ratio	Open	5.0		–45	–40	dB
REC AGC Amp mixed modulation relative level	ΔV_{CY}	T7A	T18A	T6A: f = 629 kHz, V_I = 360 mVp-p T7A: f = 4 MHz, V_I = 200 mVp-p (4 M±629 k)/4 M output ratio	Open	0		–45	–40	dB
		T8A	T18A		Open	0		–45	–40	dB
ON resistance of SW-Tr which is turned ON in REC mode	$R_{RON}17$		P-17	DC difference measured for 1 mA, 2 mA current inflow				4.0	6.0	Ω
	$R_{RON}20$		P-20					4.0	6.0	Ω
REC MUTE threshold level	MUTE-1		T2	MUTE OFF → ON		*	3.4		5.0	V
	MUTE-2		T2	MUTE ON → OFF		*	0.0		3.0	V
REC/PB threshold level	SW REC/PB			T4: Control voltage			2.2		5.0	V

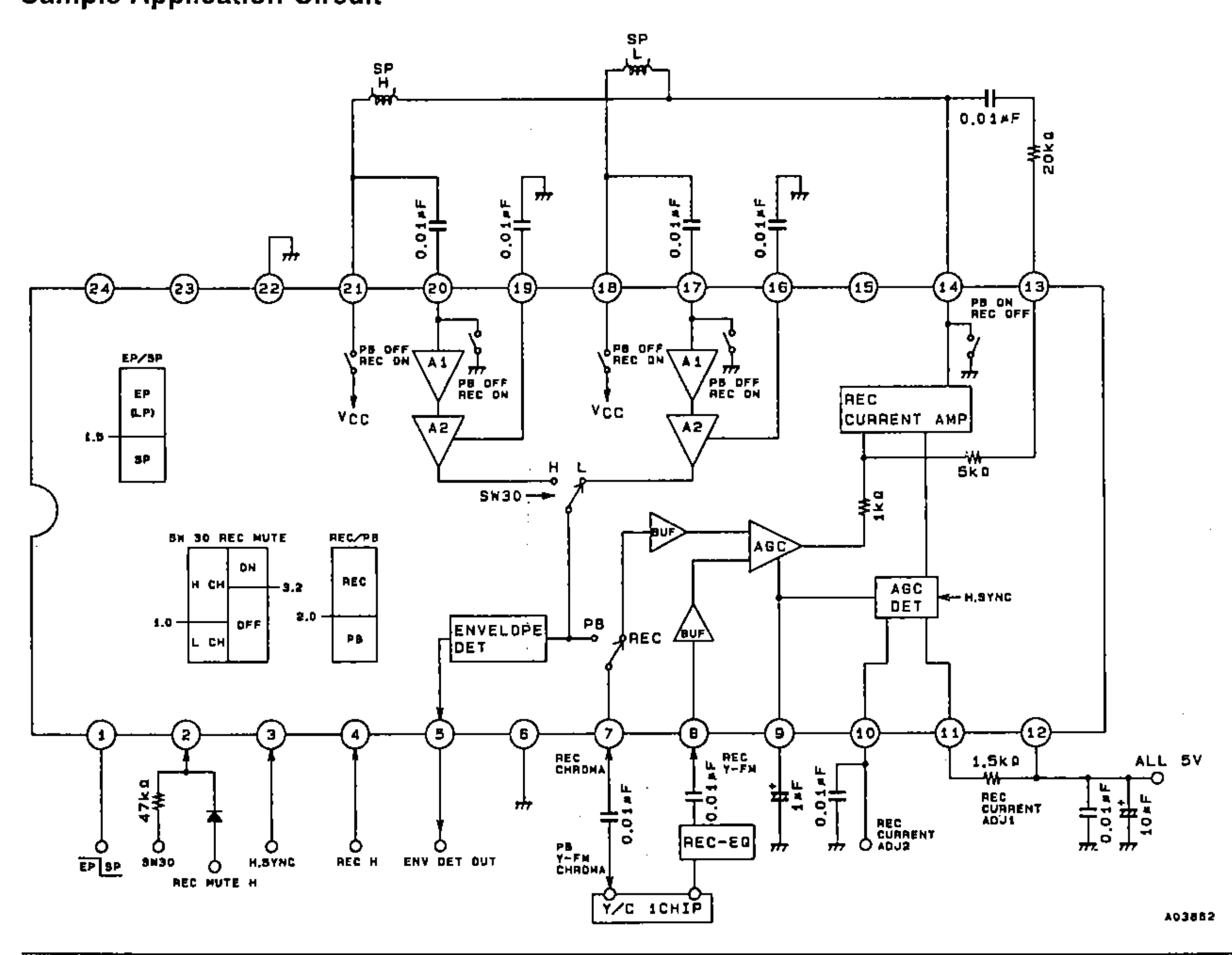
Note 2: Apply approximately 1.8 V DC to the AGC wave detection filter pin (pin 9) and fix the amplifier gain for measurement.
Note 3: Apply DC voltage to T10 (REC CUR. ADJ2) and adjust the output level.
Note : Use a resistor with a tolerance of ± 1.0% between pins 11 and 12.

"*" represents output pins.

Test Circuit Diagram



Sample Application Circuit



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